CLAIMS

1.   A method of determining impulse responses of a
medium (2) in relation to the transmission of waves
5   between different points (T1-TN), method comprising:
(a)   at least one step of emission in the course of
which waves are emitted into the medium (2) by
generating signals ei(t) on the basis of a number N of
emission points (T1-TN) belonging to the medium, where
10   N is an integer at least equal to 2 and i is an index
lying between 1 and N which designates one of said N
emission points,
(b)   at least one step of reception in the course of
which signals rj(t) are picked up from said waves after
15   transmission in said medium, at a number M of reception
points (T1-TN) belonging to the medium, where M is a
non-zero natural integer and j is an index lying
between 1 and M which designates one of said M
reception points,
20   (c)   and at least one step of determination of said
impulse responses hij(t) between each emission point i
and each reception point j on the basis of the signals
emitted ei(t) and picked up rj(t),
characterized in that in the course of step (a), said N
25   emission points (T1-TN) are made to simultaneously emit
the signals ei(t), these signals ei(t) having a
duration T and each being a sum of n substantially
monochromatic elementary signals, of like amplitude and
of respective frequencies $f_{0,i}+k.\delta f$, where $f_{0,i}$ is a
30   predetermined eigenfrequency at the point i, k is an
integer lying between 0 and n, n is an integer at least
equal to 2 and δf is a predetermined frequency
interval, the respective eigenfrequencies $f_{0,i}$ at the
various points i being distinct and lying in a
35   frequency band of width δf,
and in that in the course of step (c), each impulse
response hij(t) is calculated on the basis of a signal

of correlation between the signal ei(t) emitted at the point i and the signal rj(t) picked up at the point j.

2.   The method as claimed in claim 1, in which the respective eigenfrequencies $f_{0,i}$ at the various points i are separated pairwise by an offset $\delta f/N$.

3.   The method as claimed in claim 1 or claim 2, in which, in the course of step (c), said correlation signal is windowed by means of a gate function $\pi(t)$ of width $1/\delta f$.

4.   The method as claimed in claim 3, in which, in the course of step (c), the impulse responses hij(t) are determined through the formula:

$$hij(t) = \Pi(t) . \int ei(\theta - t) .rj(\theta)d\theta .$$

5.   The method as claimed in any one of the preceding claims, in which the waves transmitted in the medium between the emission points and the reception points are acoustic waves.

6.   The method as claimed in any one of the preceding claims, in which, in the course of step (a), the medium where the waves are emitted is reverberant.

7.   The method as claimed in any one of the preceding claims, in which the frequency interval δf is less than or equal to $1/\tau$, where τ is the temporal dispersion of the medium.

8.   The method as claimed in claim 7, in which the frequency interval δf is substantially equal to $1/\tau$, where τ is the temporal dispersion of the medium.

9.   The method as claimed in any one of the preceding claims, in which the duration T is at least equal to $N/\delta f$.

10. The method as claimed in any one of the preceding claims, in which the duration T is at least equal to $N.\tau$, where τ is the temporal dispersion of the medium.

11. The method as claimed in any one of the preceding claims, in which the elementary signals exhibit random phases.

12. The method as claimed in any one of the preceding claims, in which the waves are emitted with a certain passband, the frequencies $f0i$ comprise a minimum frequency $f0$ and the number n is determined so that the frequency band lying between $f0$ and $f0+[(n+1).\delta f]$ substantially overlaps said passband.

13. The method as claimed in any one of the preceding claims, in which the reception points are coincident with the emission points (T1-TN).